Name:

## at1117paper: Complete the Square (v313)

### Example

A square's edge length is $x$ feet. A rectangle has a height of $x$ feet and a width of 54 feet. Their combined area, found by adding the square's area and the rectangle's area, is 1120 square feet. What is the value of $x$?

**Example's Solution**

$$x^2 + 54x = 1120$$

To complete the square, add $\left(\frac{54}{2}\right)^2 = 729$ to both sides.

$$x^2 + 54x + 729 = 1849$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 27)^2 = 1849$$

Undo the squaring.

$$x + 27 = \pm\sqrt{1849}$$

$$x + 27 = \pm 43$$

Subtract 27 from both sides.

$$x = -27 \pm 43$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 16$$

### Question 1

A square's edge length is $x$ feet. A rectangle has a height of $x$ feet and a width of 54 feet. The total area, of the square and rectangle, is 1672 square feet. What is the value of $x$?

$$x^2 + 54x = 1672$$

$$x^2 + 54x + 729 = 2401$$

$$(x + 27)^2 = 2401$$

$$x + 27 = \pm 49$$

$$x = 22$$

## Question 2

A square's edge length is $x$ feet. A rectangle has a height of $x$ feet and a width of 56 feet. The total area, of the square and rectangle, is 372 square feet. What is the value of $x$?

$$x^2 + 56x = 372$$
$$x^2 + 56x + 784 = 1156$$
$$(x + 28)^2 = 1156$$
$$x + 28 = \pm 34$$
$$x = 6$$

## Question 3

A square's edge length is $x$ feet. A rectangle has a height of $x$ feet and a width of 50 feet. The total area, of the square and rectangle, is 744 square feet. What is the value of $x$?

$$x^2 + 50x = 744$$
$$x^2 + 50x + 625 = 1369$$
$$(x + 25)^2 = 1369$$
$$x + 25 = \pm 37$$
$$x = 12$$